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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,194	07/30/2003	Chae-Sung Kim	29926/39499	9239

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MARSHALL, GERSTEIN & BORUN LLP
233 S. WACKER DRIVE, SUITE 6300
SEARS TOWER
CHICAGO, IL 60606

EXAMINER

HENN, TIMOTHY J

ART UNIT	PAPER NUMBER
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2622

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/630,194

Applicant(s)

KIM, CHAE-SUNG

Examiner

Timothy J. Henn

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-13 is/are allowed.
- 6) ☒ Claim(s) 1 and 3-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 05 January 2007 have been fully considered but they are not persuasive. Applicant argues that Smith does not disclose P number of columns allocated at both sides of the pixel group for detecting a flicker frequency. However, as recognized by Applicant, Smith discloses averaging pixel values for each row and using the average values to determine a flicker frequency (e.g. Figure 8; Pages 9-12). In averaging each row, Smith inherently uses data from P number of columns at both ends of the image sensor as claimed. The examiner notes that the claims as written do not limit the flicker detection system and method to using *only* the pixel columns allocated at both sides of the pixel group. Therefore, Applicant's arguments are not considered persuasive and the rejections based on Smith are maintained below.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 3 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith et al. (WO 00/07363).

[claim 1]

Regarding claim 1, Smith discloses a pixel array of an image sensor, comprising: a pixel group, including $N \times M$ number of unit pixels, and adapted to detect an image signal, N and M being integers (Figure 7, Item 100; the examiner notes that a photo sensor array as shown is inherently an $N \times M$ array of pixels as claimed); and a pixel column, allocated along a row direction of the pixel group, and adapted to detect an average frequency of a corresponding pixel row to thereby detect a flicker noise (p. 6; Figures 3, 6 and 8) wherein the pixel column includes P number of columns allocated at both sides of the pixel group in the row direction (p. 6; i.e. averaging a row of pixel data).

[claim 3]

Regarding claim 3, Smith discloses a pixel column which is constructed to detect only one frequency component in the range of 50Hz to 200Hz (e.g. Figure 6; note that Smith discloses detecting only 1 frequency component for the lighting flicker period).

[claim 4]

Regarding claim 4, Smith discloses detecting a frequency of flicker noise which is 100Hz or 120Hz (Figures 6 and 8; pp. 11-12).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. (WO 00/07363) in view of Nagaoka et al. (US 7,034,870).

[claim 5]

Regarding claim 5, Smith discloses a pixel array including a pixel group which has $N \times M$ pixels and detects an image signal (Figure 7, Item 100; the examiner notes that a photo sensor array as shown is inherently an $N \times M$ array of pixels as claimed) and a pixel column, allocated along a row direction of the pixel group, for detecting an average frequency of a corresponding pixel row to thereby detect a flicker noise (i.e. Column 1 or Column N in the array; p. 6; Figures 3, 6 and 8); an analog-to-digital converting means for converting an analog signal provided from the pixel array to a digital signal (Figure 7, Item 104); a flicker detecting means for performing flicker detection (Figure 1, Item 112) and an integration time control means for removing the flicker noise by adjusting the integration time of the pixel array (Figure 7, Item 106). Smith discloses detecting a frequency component through the use of a fast-Fourier-transform (FFT) equation. The examiner notes that the equation claimed in claim 1 is equivalent to the general form of the FFT equation (see for example, p. 9 of the specification; Weisstein, Eric W. "Fast Fourier Transform" From Mathworld--A Wolfram Web Resource. <http://mathworld.wolfram.com/FastFourierTransform.html>). Therefore, the examiner notes that in disclose use of a FFT to determine pixel frequency, Smith inherently uses the claimed equation. However, while Smith discloses adjusting the integration time of the array based on the detected frequency, Smith does not explicitly

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disclose setting the integration time to be an integer multiple of an inverse number of the frequency component.

Nagaoka teaches that setting a charge accumulation time (i.e. integration time) to be an integer multiple of $1/(\text{flicker frequency})$ reduces the effects of flicker (e.g. c. 1, ll. 25-54; c. 8, ll. 8-45). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to set an integration time of Smith to be an integer multiple of $1/(\text{flicker frequency})$ to reduce the effects of flicker in the captured image.

[claim 6]

Regarding claim 6, Smith discloses an image sensor wherein the pixel column includes P number of columns allocated at both sides of the pixel group in the row direction (p. 6; i.e. averaging a row of pixel data).

[claim 7]

Regarding claim 7, Smith discloses a pixel column which is constructed to detect only one frequency component in the range of 50Hz to 200Hz (e.g. Figure 6; note that Smith discloses detecting only 1 frequency component for the lighting flicker period).

[claim 8]

Regarding claim 8, Smith discloses detecting a frequency of flicker noise which is 100Hz or 120Hz (Figures 6 and 8; pp. 11-12).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. (WO 00/07363) in view of Nagaoka et al. (US 7,034,870) in view of Ali (US

4,117,541).

[claim 9]

Regarding claim 9, Smith in view of Nagaoka discloses a flicker noise detection means, but does not specifically disclose a flicker noise detection means including a ROM table, multiplier, adder and register as claimed.

Ali discloses a simple structure (Figure 10a; c. 8, l. 67 - c. 9, l. 12) for computing equations of the form:

$$\theta_j = \sum_{j=1} C_j \Psi_j$$

The examiner notes that the FFT equation of claim 5 is of this form. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the simple structure shown by Ali which includes a ROM table (Figure 10a, Item 62) storing coefficients, a multiplier (Figure 10a, Item 64), and adder (Figure 10a, Item 66) and a register (Figure 10a, Item 67) to calculate the FFT equation of Smith in view of Nagaoka.

Allowable Subject Matter

7. Claims 10-13 are allowed.

[claims 10-13]

Regarding claims 10-13, the prior art does not teach or fairly suggest a method form removing flicker noise of an image sensor comprising: calculating an average frequency for a pixel row from a pixel column, converting the average frequency to a digital signal and performing the following equation for a predetermined flicker noise so

as to detect a frequency component corresponding to the flicker noise from the digital signal:

$$C_M = \sum_{k=0}^{L-1} Y_k e^{\frac{-j2\pi km}{2^L-1}} \quad (m = \text{flicker noise frequency})$$

While Smith discloses the use of FFT to determine a flicker noise frequency from row average values, Smith does not disclose calculating an average frequency for a corresponding pixel row and converting the average frequency to a digital signal as claimed.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J. Henn whose telephone number is (571) 272-7310. The examiner can normally be reached on M-F 11-7.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivek Srivastava can be reached on (571) 272-7304. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TJH
3/23/2007



TUAN HO
PRIMARY EXAMINER